EXPRESS5800/1080Xd/1160Xd/1320Xd

Site Preparation Guide

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PN: 456-01682-000 October 2003

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Using This Guide

This guide contains information that helps you prepare your site for the installation of an Express5800/1000 Series server. By following these site preparation guidelines, you can help ensure a smooth and successful installation of your server. This guide is intended for system administrators and facilities personnel who are preparing the site for installation of an Express5800/1080Xd, 1160Xd, or 1320Xd Server.

Proper site preparation and maintenance are vital to the reliability of any computer system. As our customer, it is your responsibility to ensure that the proper facility resources and conditions are maintained. This will allow us to provide support services in accordance with the NEC "ServerCare Service Warranty Program."

This guide includes:

- A site planning overview
- Facility requirements
- Electrical requirements
- Environmental requirements.

Who Should Use This Guide

This guide is intended for system administrators and facilities personnel who are preparing the site for an Express5800/1000 Series server installation.

Symbols and Conventions

This guide uses the following text conventions and graphics symbols.

Warnings, cautions, and notes have the following meanings:

WARNING

Warnings alert you to situations that could result in serious personal injury or loss of life.

CAUTION

Cautions indicate situations that can damage the system hardware or software.

Note: Notes give important information about the material being described.

Safety Notices

⚠ WARNING

To avoid a risk of injuries, installation should be performed by trained technical personnel.

It takes two to three people to unpack your server and two people to maneuver the server, after unpacking. A tall rack is quite unstable, especially when not fixed by stabilizers.

Your server is equipped with a front stabilizer. Engage the front stabilizer during installation. For stability and to distribute the weight, also attach side stabilizers or install two or more racks together. Otherwise, the rack may topple over and cause injuries.

If you extend two or more devices from the rack at the same time, the rack may topple over on you. Extend only one device from the rack at a time.

Exercise great care not to hurt your fingers on the rails when you mount/dismount the equipment into/from the rack.

- Elevated Operating Ambient Temperature – If installed in a closed or multi-unit rack assembly, the operating ambient temperature of the rack environment may be greater than the room ambient environment. Therefore, consideration should be given to installing the equipment in an environment compatible with a maximum rated ambient temperature of 35°C.
- Reduced air Flow – Installation of the equipment in a rack should be such that the amount of air flow required for safe operation of the equipment is not compromised.
- To prevent fires, and damage to rack equipment and supply wiring, make sure that the rated load of the power branch circuit is not exceeded. Equipment nameplate ratings should be used when addressing this concern. For more information on installation and wiring of power-related facilities, contact your electrician or local power company.
- To prevent electrical shock, connect all rack and rack support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.
- For safe operation, only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the USA those wiring standards are regulated by Underwriter Laboratories (UL); in the U.K., by the Institution of Electrical Engineers, (IEE) and in Canada by the Canadian Standards Association (CSA).

Safety Notices for Users Outside of the U.S.A. and Canada

- **PELV (Protected Extra-Low Voltage) Integrity:** To ensure the extra-low voltage integrity of the equipment, connect only equipment with mains-protected electrically-compatible circuits to the external ports.
- **Remote Earths:** To prevent electrical shock, connect all local (individual office) computers and computer support equipment to the same electrical circuit of the building wiring. If you are unsure, check the building wiring to avoid remote earth conditions.
- **Earth Bonding:** For safe operation, only connect the equipment to a building supply that is in accordance with current wiring regulations in your country. In the USA those wiring standards are regulated by Underwriter Laboratories (UL); in the U.K., by the Institution of Electrical Engineers, (IEE) and in Canada by the Canadian Standards Association (CSA).

If You Need Help

Contact NEC Technical Support at **1-866-269-1239**.

Site Planning Overview

Choosing the Server Location

You need to be aware of the following requirements whether you are providing computer-room space or other properly prepared space for your server:

- Locate the server away from high-traffic areas and potential impacts. High-traffic areas include patch panels, experimental equipment, or equipment that needs frequent physical reconfiguration.
- Choose a location where the server will be free from significant temperature or humidity changes, or possible damage from moisture.
- Locate the server in a clean environment, free from smoke and dust.
- Verify that the location you select has a sturdy, level floor, and is not subject to vibration. The rack holding the server must be stable during normal operation and service.
- Make sure the server has adequate space in front of and behind the rack for times when service or reconfiguration is necessary. If the rack has a door, it must be able to open completely to allow access to the front and rear panels of the server.
- Make sure there is adequate power and the correct receptacle type for each server component, the rack power strips, and the UPSs. *Do not* use extension cords to plug in any of the server components.

Customer Responsibilities

You are responsible for scheduling, planning, and preparing a suitable environment for the installation and operation of the Express5800/1000 Series server.

The server models described in this guide are primarily designed to be installed and operated in a computer room (controlled) environment. If large scale servers are new to your site, you will need to pay particular attention to the following items:

- Local building codes
- Local electrical codes
- Local safety codes
- Space and weight limitations and server accessibility
- Environmental requirements (temperature, humidity, etc.)
- Electrical and grounding requirements.

If your Server is to be installed in an existing computer room, you should analyze and integrate the following items into the site plan:

- Available space
- Additional environmental requirements
- Additional electrical requirements.

NEC Responsibilities

NEC will install your Express5800/1000 Series server, including:

- Moving all server cabinet containers and accessory boxes shipped with the server to the intended installation site
- Unpacking the Express5800/1000 Series server and any accessory boxes
- Inspecting the server for any shipping damage
- Installing all accessory components including hard disk drives and cabinet stabilizers
- Powering up, configuring and running server test/diagnostics.

Facility Requirements

This section contains information about clearance and space requirements for your Express5800/1000 Series server. This data should be used as the basic guideline for space plan developments. Other factors, such as airflow, lighting, and power requirements must also be considered.

Delivery Requirements

There should be enough clearance to move equipment safely from the receiving area to the computer room. Permanent obstructions, such as pillars or narrow doorways, can cause equipment damage. Packaging dimensions for the system cabinet(s) determine whether all paths from the receiving area to the installation site are wide enough, whether all doorways are tall enough, and whether elevator door size and weight restrictions can support passage of the system cabinets.

Before moving equipment, study the route it will take, from the receiving area to the installation site. Take measurements to ensure problem-free transport of equipment.

Consider the following factors:

- Height, width, and location of doors
- Size, capacity, and availability of an elevator
- Width of passageways from receiving area to installation area
- Passageway restrictions (bends, slopes, or obstructions)
- Floor loading and floor and wall covering protectors
- Fire code restrictions for entryways and exits for the site.

Table 1 lists the dimensions for the system cabinets including the packaging and the shipping pallet.

Table 1. Packaged Server Cabinets Dimensions

Express5800/ System	Width	Depth	Height
1320Xd Main Cabinet	43.0 in 109.20 cm	50.9 in 129.2 cm	80.0 in 204.0 cm
1160Xd Main Cabinet	43.0 in 109.20 cm	50.9 in 129.2 cm	80.0 in 204.0 cm
1320Xd/1160Xd Expansion Cabinet	43.0 in 109.20 cm	50.9 in 129.2 cm	80.0 in 204.0 cm
1080Xd Cabinet	40.0 in 101.6 cm	51.0 in 129.5 cm	64.0 in 162.6 cm

Operational Space Requirements

Proper clearance around the cabinets must be provided for proper cooling airflow and service of the system. Reduced airflow around equipment causes overheating, which can lead to equipment failure. Therefore, the location and orientation of air conditioning ducts, as well as airflow direction, are important. Obstructions to equipment intake or exhaust airflow must be eliminated.

The locations of lighting fixtures and utility outlets affect servicing operations. Plan equipment layout to take advantage of lighting and utility outlets. Do not forget to include clearance for opening and closing equipment doors.

When considering the server service area space requirements, if other equipment is located so that it exhausts heated air near the cooling air intakes of the computer system cabinets, larger space requirements are needed to keep ambient air intake to the computer system cabinets within the specified temperature and humidity ranges.

Space planning should also include the possible addition of equipment or other changes in space requirements. Equipment layout plans should also include access provisions for the following:

- Routing data and power cables
- Air conditioning ducts, filters, lighting, and electrical power hardware
- Power conditioning equipment
- Cleaning and maintenance of cabinets.

Table 2 lists the dimensions for the unpacked system cabinets.

Table 2. Unpacked Server Cabinet Dimensions

Express5800/ System	Width	Depth	Height
1320Xd Main Cabinet	23.6 in 60.0 cm	40.9 in 104.0 cm	70.9 in 180.0 cm
1160Xd Main Cabinet	23.6 in 60.0 cm	40.9 in 104.0 cm	70.9 in 180.0 cm
1320Xd/1160Xd Expansion Cabinet	23.6 in 60.0 cm	40.9 in 104.0 cm	70.9 in 180.0 cm
1080Xd Cabinet	24.0 in 61.0 cm	39.0 in 99.0 cm	50.0 in 127.0 cm

Clearance and Access Guidelines

For normal operation, you'll need to maintain approximately 2 feet (0.6 meters) of open space in front of and behind the rack. This allows free access to the components in the rack for operating changes or adjustments.

For service, you'll need approximately 3 feet (1.0 meters) of open space in front of the rack and 2 feet (0.6 meters) of open space behind the rack. This allows for the removal of any component that needs to be replaced.

The left and right sides of the server cabinets, when not adjacent to other cabinets, should have an open space of about 19 inches (0.5 meters).

For normal operation, you'll need to maintain approximately 3 feet (1.0 meters) of open space above the rack for proper ventilation.

Floor Loading

The computer room floor must be able to support the total weight of the installed computer system as well as the weight of the individual cabinets as they are moved into position.

Floor loading is usually not an issue in non-raised floor installations, unless this floor is located in a very old building.

> ***Note***: Any floor system under consideration for an Express5800/1000 Series server installation should be verified by an appropriate floor load-bearing consultant.

Raised Floor Loading

Raised floor loading is a function of the manufacturer's load specification and the positioning of the equipment relative to the raised floor grid. While NEC cannot assume responsibility for determining the suitability of a particular raised floor system, it does provide information for the customer or local agencies to determine installation requirements.

The following guidelines are recommended:

- Because many raised floor systems do not have grid stringers between floor stands, the lateral support for the floor stands depends on adjacent panels being in place. To avoid compromising this type of floor system while gaining under floor access, remove only one floor panel at a time.
- Larger floor grids (bigger panels) are generally rated for lighter loads.

> **⚠ WARNING**
>
> Do not install any raised floor system until you have carefully examined its specifications to verify that it is adequate to support the appropriate installation.

Non-raised Floor

- The non-raised floor must be capable of withstanding a uniform load of 1,220 kg/m2 (250 lb/ft2) or a load of 454 kg (1,000 lb) on any 6.5 cm2 (1.0 in.2) with a maximum deflection of 2.5 mm (0.1 in.).
- The floor must be level within +3.2 mm (1/8 in.) overall and within +1.6 mm (1/16 in.) in any 3.05 m (10 ft) distance.
- Floor surfaces must be resistant to cracking and dust, must withstand the movement of heavy equipment on casters, and must resist the buildup of static electricity.
- Cleaning products containing ammonia must not be used on the floor.
- The use of electrostatic discharge (ESD) protective floor wax in place of ESD-protective floor materials is not recommended. However, the resistance to ground of any ESD-protective flooring from any point on its surface must be:
  - Greater than 1 x 105 (100 thousand) ohms
  - Less than 1 x 108 (100 million) ohms.

Table 3 lists the weights for the system cabinets including the packaging and the shipping pallet. Table 4 lists the dimensions and weights for the unpacked cabinets

Table 3. Packaged Server Cabinet Weights

Express5800 System	*Weight
1320Xd Main Cabinet	1166.0 lbs. 529.0 kg
1160Xd Main Cabinet	956.9 lbs. 433 kg
1320Xd/1160Xd Expansion Cabinet	533.4 lbs. 251 kg
1080Xd Cabinet	320.4 lbs. 145.3 kg

*Approximate Weights

Table 4. Unpacked Server Cabinet Weights

Express5800 System	*Weight
1320Xd Main Cabinet	981 lbs. 445 kg
1160Xd Main Cabinet	769.4 lbs. 349.0 kg
1320Xd/1160Xd Expansion Cabinet	368 lbs. 167 Kg
1080Xd Cabinet	220.4 lbs. 100 kg

*Approximate Weights

Electrical Requirements

You should consider installing a separately derived power system for your Express5800/1000 Series server. This ensures that you can control the hardware grounding, with all grounds brought to a single point, and that uncontrolled equipment, such as coffee makers or floor polishers, cannot be plugged into the same power source as the server hardware.

If you do not create a separately derived power system, you need to make sure the power outlets you use are from the same distribution panel. This helps to prevent the occurrence of ground loops that can be caused by plugging equipment into power sources with different ground potentials.

For the UPSs, you'll need to run separate 120-volt, 30-amp power lines with a NEMA L5-30R receptacle, or 230-volt, 30-amp power lines with an IEC C-19 receptacle, to the location where you are installing the server. If you run more than one power line because you have more than one UPS, you must make sure the power lines come from the same distribution panel.

You should have all the electrical work at your site done by a licensed electrician. All the electrical changes must meet country, state, and local electrical codes.

As you choose the location for your Express5800/1000 Series server, keep these electrical requirements in mind:

- Make sure there is adequate, dedicated power for the UPSs that are part of your server environment.
- Make sure your location is away from major electrical equipment such as motors, air conditioners, or elevators.
- Make sure the location is not subject to electrostatic buildup.
- Plug only your server equipment into the power strips. Do not plug in coffee makers, radios, lights, or other non-server devices.

System Power Requirements

Table 5 shows the electrical specifications for all Express5800/1000 Series server configurations. Make sure your site meets these specifications.

Table 5. Server Cabinets Power Requirements

Express5800/ System	Power Requirement	Necessary Power Capacity (A)	Power Dissipation (kVA)*	Power Drop
1320Xd Main Cabinet	200-240VAC /50~60Hz/single phase	22.1 min 44.6 max	5.3 min 10.7 max	L6-30R 30A 4 required
1160Xd Main Cabinet	200-240VAC /50~60Hz/single phase	16.3 min 27.1 max	3.9 min 6.5 max	L6-30R 30A 2 required
1320Xd/1160Xd Expansion Cabinet	200-240VAC /50~60Hz/single phase	3.8 min 22.5 max	.9 min 5.4 max	L6-30R 30A 4 required
1080Xd Cabinet	200-240VAC /50~60Hz/single phase	14.6 min 18.4 max	3.5 min 4.4 max	L6-30R 30A 1 (hardwired)

* See Power Dissipation Equation information in Table 6 to compute the power dissipation for your configuration.

Table 6. Power Dissipation Equations:

Express5800/ System	Power Dissipation (kVA) Equation
1320Xd Main Cabinet	Power Dissipation (kVA) = (Number of CPUs x 0.191) + (Number of PCI Units x 0.886) + 2.818
1160Xd Main Cabinet	Power Dissipation (kVA) = (Number of CPUs x 0.191) + (Number of PCI Units x 0.886)+ 1.409
1080Xd Cabinet	Power Dissipation (kVA) = (Number of CPUs x 0.22) + (Number of PCI Units x 0.886) + 1.71

Computer Input Power Conditions

Input Power Specifications

The input power source conditions for the power-receiving terminal areas of computers are listed in Table 7. Figure 1 illustrates the electrical connections for the NEMA L6-30R 230 volt power receptacle required for your server.

Table 7. Computer Input Power Conditions

Item	Computer Input Power Condition
Phase quantity	Single-phase 3 lines
Voltage (Average value)	208V±10%*
Voltage (Peak value)	208V+15%, -20% (Drift time: Less than 0.5 sec)
Frequency (Average value)	50 Hz or 60 Hz ± 1 Hz
Frequency (Peak value)	50 Hz or 60 Hz ± 1 Hz to -2.5 Hz (Drift time: within 1 sec)
Waveform distortion rate	Within 8%
Grounding	Computer-specialized grounding (Grounding resistance: less than 100Ω)

* It is necessary to take into account 2% as the voltage drop of the cable between the distribution panel and the equipment. When the input power is ON/OFF, the rise/fall time of the input voltage shall be less than 2 seconds.

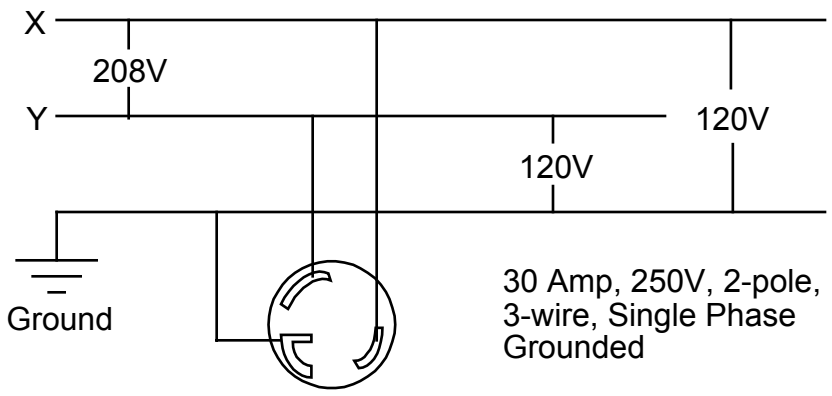


Figure 1. NEMA L6-30R 230-Volt Power Receptacle

Grounding Conditions

Grounding

The site building shall provide a safety ground/protective earth for each AC service entrance to all system cabinets. Install a PE (protective earthing) conductor that is identical in size, insulation material, and thickness to the branch-circuit supply conductors. The PE conductor must be green with yellow stripes. The earthing conductor described is to be connected from the unit to the building installation earth or, if supplied by a separately derived system, at the supply transformer or motor-generator set grounding point.

As the grounding for computers, have a designated grounding line up to the computer's power distribution panel. The grounding resistance in this case should not be more than 100Ω. For information on its thickness, refer to(2) Grounding condition (a). The grounding for computers shall be basically independent from other devices.

(1) Purpose of grounding
Computer devices are grounded for the following purposes.

(a) Reduced grounding voltage
To aim for reduced contact voltage by connecting the ground with a low resistance when high voltage is applied to the frame due to an insulation breakdown of a device or a cable, etc.

(b) Prevention of inductive failures, etc.
To place the voltage potential between the computer device frame and the ground on the same voltage potential level as that of the ground by allowing the voltage potential generated through electrostatic induction to the ground.

(c) Reliable operation of the circuit breaker
Actively pass the ground current to the ground to secure a reliable operation of the leakage breaker in case of accidents of defective insulation.

(d) Prevention of power supply failures
To aim for reduction of power supply failures by actively operating the over-current breaker when in error.

(e) Realization of equal voltage potential to the ground
To aim for prevention of electric-shock disasters by equalizing the voltage potential to the ground based on a single-point grounding method.

(f) Prevention of contacts between low and high voltage circuits
To aim for prevention of insulation breakdown of low voltage circuits and electric-shock disasters deriving from contacts between low and high voltage circuits.

(2) Grounding conditions
When performing the grounding work, make sure to pay attention to the specifications defined by NEC in addition to the definitions of electric facility technology standards.

(a) The thickness of the grounding conductor should be at least 8 mm^2 in terms of the cross section and the same or larger than the main power cable. In the case of the medium- or large-size system, this should be at least 38 mm^2.

(b) Two cables are required for the grounding: one dedicated for computer grounding and the other for security type-D grounding.

(c) If it is unavoidable to share the security grounding electrode and the computer grounding electrode, connect them near the ground. Addition of leakage current from the security grounding electrode will result in activating the leakage breaker. The grounding is also aimed at preventing the flow of noises from other devices into computers.

(d) When using the steelwork of the building as a substitute for the grounding electrode, connect the cable as close as possible to the foundation of the building.

(e) Make sure that the grounding conductor is routed to the power distribution panel.

Environmental Requirements

The Express5800/1000 Series servers are designed to operate in a computer-room environment. When you select a location, you should:

- Make sure the location has a sturdy, level floor, and is not subject to vibration.
- Make sure the location is away from high-traffic areas.
- Make sure the location is clean and free from dust, smoke, or other airborne contaminants.
- Make sure the location does not have significant temperature changes. Choose a location where the temperature does not vary more than 18°F (7.78°C) per hour.
- Make sure the location does not have significant humidity changes. A location with approximately 40 percent humidity can prevent problems stemming from electrostatic discharge.
- Make sure the location has adequate space in front of and behind the rack. You must be able to connect cables and service the parts of your hardware. It also needs adequate airflow for cooling.

If security for the Express5800/1000 Series server is important, you should address this issue during site planning. Planning and implementing security for the hardware, before its installation, will save disrupting the hardware and its users at a later time.

Table 8 provides information on operating and storage temperature and humidity specifications for the Express5800/1000 Series server hardware components. Make sure your environment meets the narrowest range of specifications in the table.

Table 8. Environmental Specifications

<table>
<tr><th>Express5800/
System</th><th>Temperature</th><th>Humidity</th><th>Heating Value (kj/h)</th><th>Airflow (m3/min)</th></tr>
<tr><td>1320Xd
Main Cabinet</td><td rowspan="4">Operating:
59° to 90° F
(15° to 32° C)

Non-operating:
14° to 131°F
(+5° to 45°C)</td><td rowspan="4">Operating:
20 to 80% RH

Non-Operating:
8 to 80% RH</td><td>37,620</td><td rowspan="2">CPU/memory
sub-chassis: 32.00
DPS: 1.50</td></tr>
<tr><td>1160Xd
Main Cabinet</td><td>20,520</td></tr>
<tr><td>1320Xd/1160Xd
Expansion Cabinet</td><td>26,676</td><td>PCI BOX: 8.0
DPS: 1.50</td></tr>
<tr><td>1080Xd Cabinet</td><td>12,654</td><td>9.00</td></tr>
</table>

Air Flow

The servers require that the cabinet air intake temperature be between 59°F and 90°F (15° C and 32°C) at 1271 CFM.

Figure 2 illustrates the location of the inlet and outlet air ducts on a single Epress5800/1320Xd and 1160Xd main cabinet. Figure 3 illustrates the location of the inlet and outlet air ducts on the Epress5800/1320Xd I/O expansion cabinet. Figure 4 illustrates the location of the inlet and outlet air ducts for the Epress5800/1080Xd Server.

Make sure you do not obstruct the airflow around the rack with large containers, boxes, desks, chairs, or other objects. This can cause the server hardware in the rack to run at an elevated temperature and possibly shorten individual component life.

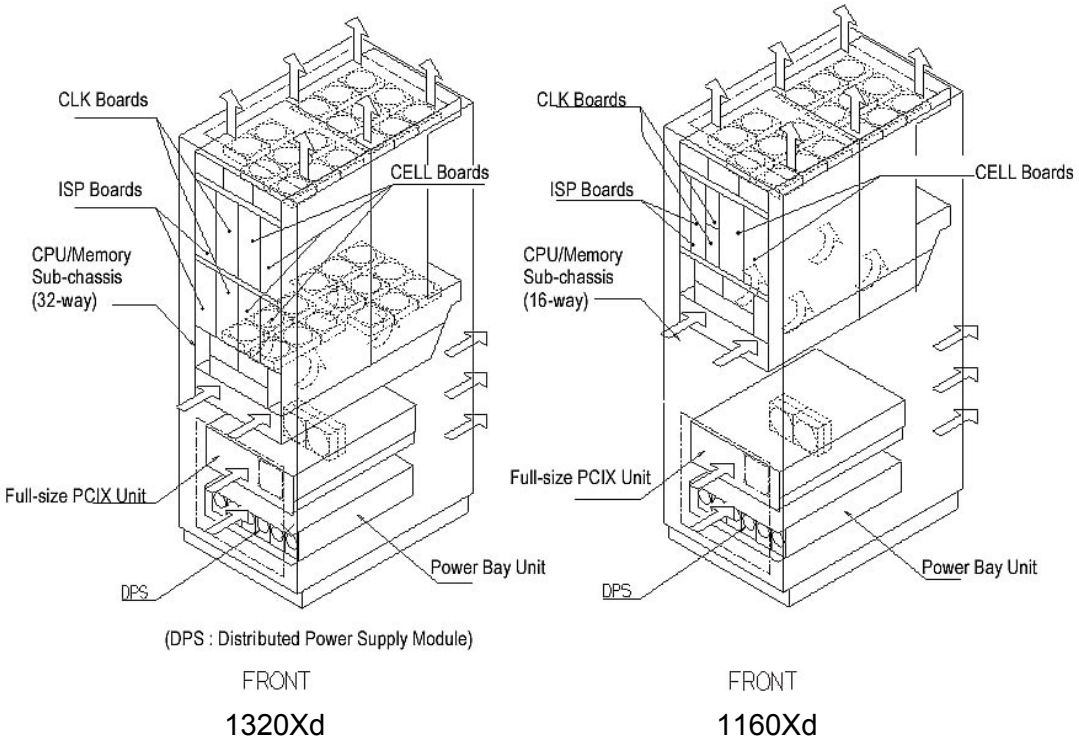


Figure 2. 1320Xd and 1160Xd Main Cabinet Air Flow

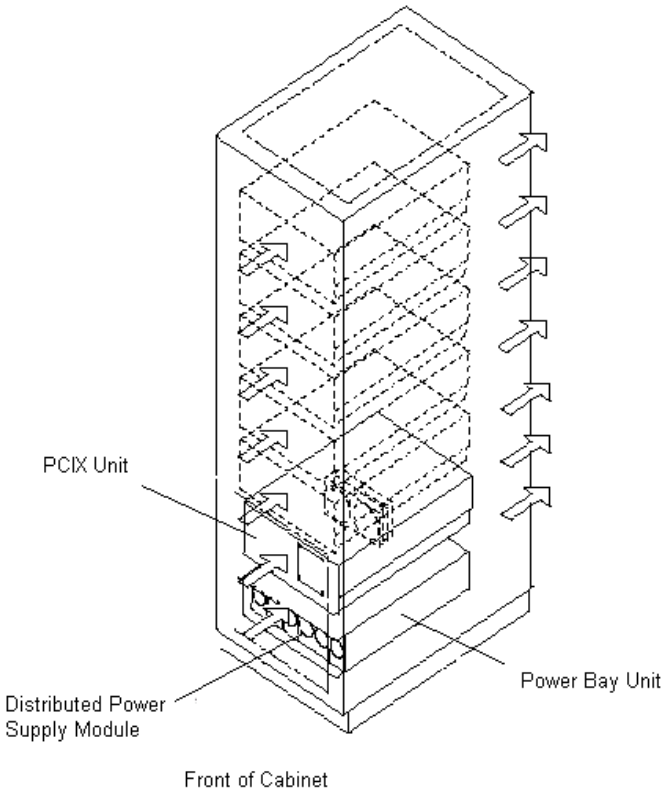


Figure 3. I/O Expansion Cabinet Air Flow

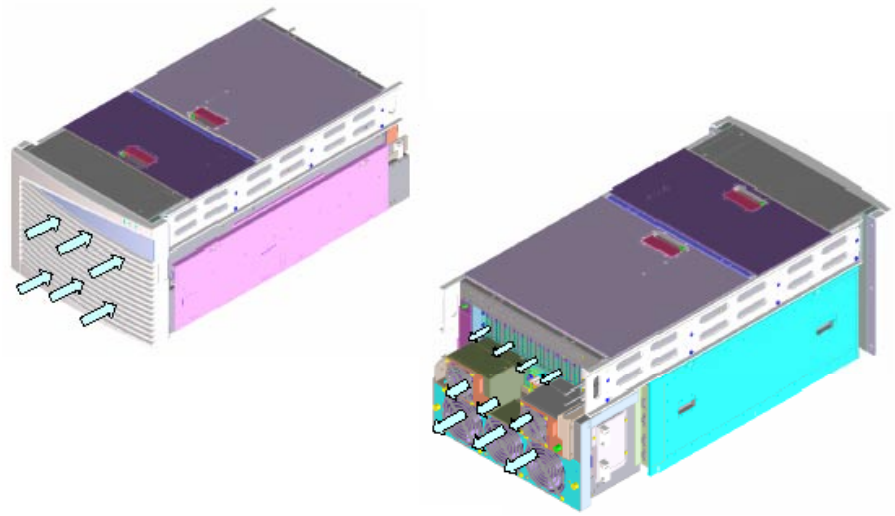
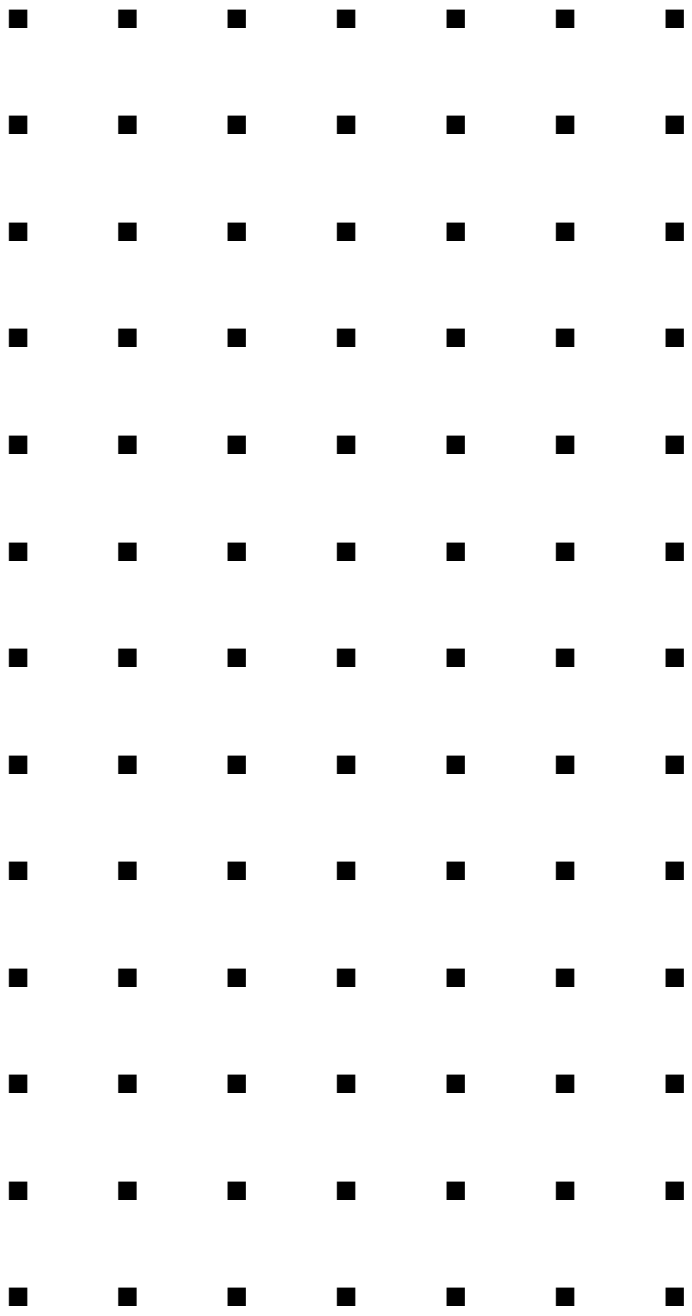


Figure 4. 1080Xd Air Flow



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